Lighting at the Puffing Field

As you all know, there is no mains power at the Puffing Park. That is not a serious problem but there have been times when it would have been nice to have a decent light to see by in the containers and the storage shed by the station. For example, when we have arrived back at the Puffing Park at dusk after the annual exhibition with a truck load of stuff to be put back into the container. It was like the black hole of Calcutta inside the container back then, but not any more. Thanks to efforts of Neil Byrne and Jack Green, with a modest contribution from Roger Stephen, we now have fully automatic solar powered lighting systems in both containers and the storage shed so you can actually find what you are looking for at any time of day and in any weather. So how was it done?

The power source for the container system is a south facing 32 cell monocrystalline silicon solar panel measuring 1050mm by 540mm, mounted on a frame on the roof of container No 1. It produces a maximum of 100 Watts at a maximum of 17.5 Volts (5.5 Amps), but even when the sun is not out it still produces significant power. Of course, it produces no power in the dark so the system has to have a storage battery so the lights work at night. In our case it is an ordinary 12 Volt car battery but you cannot simply connect the solar panel to the battery or the system would no doubt suffer and quickly fail. So, the solar panel feeds into a clever little unit called a solar charge controller.

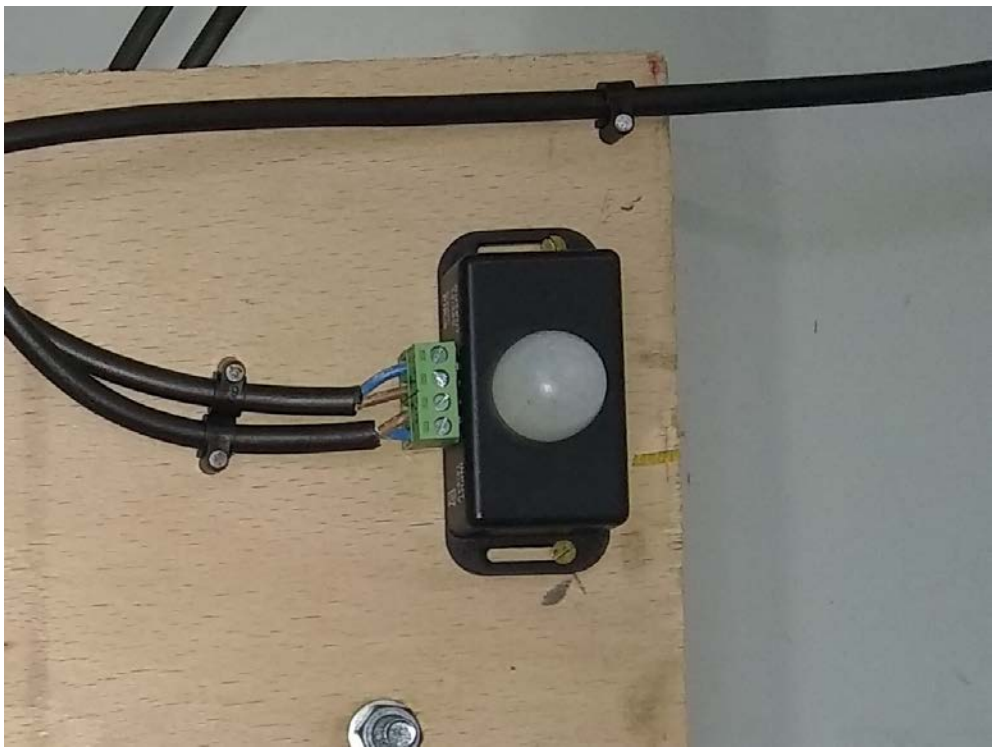
The solar charge controller is an electronic unit which regulates the power supplied to charge the battery and makes sure it does not discharge back into the solar panel at night and in dull weather. It also regulates the supply to the power circuit, in our case the lights, so that the battery cannot become fully drained. Our controller is somewhat over-rated with a maximum solar panel input power of 1300 Watts and maximum input voltage of 50V. Rated output current is a massive 100 Amps which is far more than anything we need for the lighting systems. The unit has an LCD display which can indicate various functions including battery voltage, battery charge state, solar panel charge current, load discharge current, general operating indicators and faults. We leave ours displaying battery voltage and the general operating indicators. The controller unit even has two USB sockets if you need to charge your mobile phone!

The lighting circuit is wired into the charge controller. Gone are the days of hot and power hungry incandescent light bulbs – we now have super-efficient LED lights available in a wide variety of types. Neil and Jack have fitted LED rope lights, 8mm wide by 3mm thick, down the full length of the ceiling in both containers. They stay cool when switched on, have a self-adhesive backing and are mounted on a foamed PVCu strip which is bolted securely to the container ceiling. They operate on 12 Volts DC and are rated at either 18W or 40W – I'm not actually sure which we have. Anyway, they give an excellent light level throughout the whole container.

Leaving the lights switched on, thus draining the battery at night, was a bit of a worry. However, Roger found some neat little 12 Volt PIR detector switches which allow fully automatic operation of the lights. Just walking into the container triggers the lights to come on, they stay on while you are in there, and they are set to switch off a few minutes after you leave. There is no need to remember to turn the lights off! Fitted between the charge controller and the LED rope lights they have a tiny current drain when the lights are off and the whole system has now been operating for over six months with no trouble. The storage shed by the station has a similar system working in the same way but uses a much smaller solar panel, a short LED strip light and a different brand of charge controller. It too has been operating well for six months.

The 32 cell solar panel on the roof of container No 1.

This is the solar charge controller. The LCD display is showing the battery voltage at 12.6V, 80% charged, solar panel is charging, and the load (the LED lights) is drawing power.



The PIR detector switches are mounted near the entrance doors and turns the lights on and off for you when you enter and leave the container or storage shed.

Inside container No 1. The ceiling mounted LED rope light runs down the whole length of each container giving a very good level of illumination.